

REMARKS

Claims 7-14, 19, and 21-38 are pending in the application. In the outstanding Office Action, the Examiner requested information to identify the specific "chemical composition" recited in claims 21 and 22, as provided for under 37 CFR 1.105.

The support for the "chemical composition" recited in claims 21 and 22 is found at paragraphs [0042] through [0050], [0065], [0094], and [0103] through [0110], as follows:

[0042] The encapsulating material of the first portion 37 can comprise a flexible film which has been laminated to the chip 10. In the preferred embodiment, in order to provide the most durable assembly, especially during severe thermal cycling, the significant properties of the first portion 37 are:

[0043] 1. After cure, a coefficient of thermal expansion in the vicinity of 25 PPM/.degree. C.;

[0044] 2. After cure, a Tg above 120.degree. C.;

[0045] 3. After cure, a modulus greater than 0.1 GPa, preferably greater than 4 GPa;

[0046] 4. After cure, high adhesion to the chips passivation layer that usually consists of silicon nitride, polyimide, or benzocyclobutene;

[0047] 5. Solventless;

[0048] 6. A chemical composition such that it does not interfere or adversely affect the properties of the second portion 39 of the encapsulant to which it will be mated; and

[0049] 7. After cure, high adhesion to the second portion 39 of the encapsulant.

[0050] In general terms, the adhesive flux 39 comprises a liquid or solid composition which acts as both a primary fluxing agent and a crosslinking monomer or polymer. More specifically, the adhesive fluxes comprise

the following:
etc. Then later in paragraph

[0065] Further, the adhesion properties, mechanical integrity, and corrosion resistance achieved with the fluxing agents are superior to those achieved with prior art polymer fluxing agents because there is no need to add aggressive fluxing activators. The inventive fluxing agents are fully crosslinked and all components thereof are chemically immobilized upon curing. Even the reaction by-products of flux deoxidization of the metals may be chemically bound in the polymer matrix.

[0094] In preparing the fluxing composition, the proportions of the five components may be varied over a considerable range and still yield acceptable fluxing activity as well as good post cured material properties. Preferably, the fluxing composition employed does not produce gaseous byproducts that can result in the formation of bubbles in the final cured composition. This can be achieved with thermally curable adhesive compositions preferably formulated as follows:

[0103] In order for the thermally curable adhesive composition to achieve the largest spreading and wetting by the solder, it must achieve and maintain low viscosity up to the temperature at which the solder melts and wets the metallizations. If the composition becomes too thick before the solder has melted, it will impede the flow of the solder melt and reduce the degree of metal soldering. For this reason, the curing of the composition must occur slowly relative to the time required to reach the melting point of the solder powder. This can be achieved by selection of the components with appropriate crosslinking temperatures and formulating the appropriate proportions by use of a differential scanning calorimeter to control reaction rates and times.

[0104] The inventive thermally curable composition exhibit the following features:

[0105] a) provides sufficient flux activity to promote the solder bump to readily wet the metallization on the substrate during solder reflow, without the presence of corrosive flux activators that can contaminate the

silicon chip;

[0106] b) promotes solder wetting and self-alignment of the chip to the pads on the substrate by action of the wetting force of the molten solder, during the solder reflow cycle, no curing of the flux composition occurs until the solder bump has been melted;

[0107] c) reduces or eliminates gaseous evolution during the reflow cycle that would otherwise create voids;

[0108] d) cures quickly and soon after solder bump melts;

[0109] e) demonstrates little shrinkage of the composition during curing to minimize the stress resulting from the curing process and subsequent cooling; and

[0110] f) forms strong adhesion of the cured composition to the chip, substrate and solder joints.

(emphasis added)

Conclusion

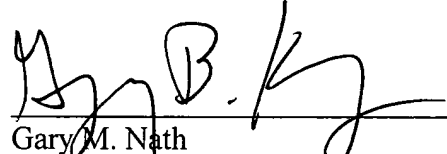
The foregoing is believed to be fully responsive to the request under 37 CFR 1.105. It is respectfully submitted that the application is now in condition for allowance. If it is believed that the application is not in condition for allowance, the Examiner is invited to call the undersigned.

In the event this paper is not timely filed, Applicants petition for an appropriate extension of time. Please charge any fee deficiencies or credit any overpayment to Deposit Account No. 14-0112.

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